

# On the species of the genus *Mistaria* Lehtinen, 1967 studied by Roewer (1955) from Africa (Araneae, Agelenidae)

Grace M. Kioko<sup>1,2,3</sup>, Peter Jäger<sup>4</sup>, Esther N. Kioko<sup>2</sup>, Li-Qiang Ji<sup>1,3</sup>, Shuqiang Li<sup>1,3</sup>

**1** Institute of Zoology, Chinese Academy of Sciences, Beijing 100101, China **2** National Museums of Kenya, Museum Hill, P.O. Box 40658-00100, Nairobi, Kenya **3** University of Chinese Academy of Sciences, Beijing 100049, China **4** Senckenberg Research Institute, Senckenberganlage 25, D-60325 Frankfurt am Main, Germany

Corresponding author: Shuqiang Li ([lisq@ioz.ac.cn](mailto:lisq@ioz.ac.cn))

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## Abstract

Eleven species of the spider family Agelenidae Koch, 1837 are reviewed based on the type material and transferred from the genus *Agelena* Walckenaer, 1805 to *Mistaria* Lehtinen 1967. These species occur in various African countries as indicated and include: *M. jaundea* (Roewer, 1955), **comb. nov.** (♂, Cameroon), *M. jumbo* (Strand, 1913), **comb. nov.** (♂♀, Central & East Africa), *M. kiboschensis* (Lessert, 1915), **comb. nov.** (♂♀, Central & East Africa), *M. keniana* (Roewer, 1955), **comb. nov.** (♀, Kenya), *M. lawrencei* (Roewer, 1955), **comb. nov.** (♀, Zimbabwe), *M. longimamillata* (Roewer, 1955), **comb. nov.** (♀, Mozambique), *M. moschiensis* (Roewer, 1955), **comb. nov.** (♀, Tanzania), *M. mossambica* (Roewer, 1955), **comb. nov.** (♀, Mozambique), *M. nyassana* (Roewer, 1955), **comb. nov.** (♀, Malawi), *M. teteana* (Roewer, 1955), **comb. nov.** (♂, Mozambique) and *M. zuluana* (Roewer, 1955), **comb. nov.** (♀, South Africa).

## Keywords

Ageleninae, *Agelena*, new combination, redescription, transfer

## Introduction

The family Agelenidae C.L. Koch, 1837 has been under review for over two centuries, with most genera transferred out of the family to other families such as Amaurobiidae Thorell, 1870, Dictynidae O. Pickard-Cambridge, 1871, Hahnii-



dae Bertkau, 1878, Linyphiidae Blackwall, 1859, Pisauridae Simon, 1890 and Zodariidae Thorell, 1881 (Roth 1956, 1965; Lehtinen 1967). The distinguishing characters of this family are a paired colulus and elongated posterior pair of spinnerets (Dippenaar-Schoeman and Jocqué 1997; Lehtinen 1967; Zhang et al. 2005). An extensive revision has also been suggested within the family, whereby species are from time to time attributed to different genera. A good example is the type genus *Agelena* Clerck, 1757 which is considered to be highly polyphyletic. Therefore, suggestions have been made to transfer any species that differs greatly from the type *Araneus labyrinthicus* Clerck, 1757, currently *Agelena labyrinthica* (Clerck, 1757), to other genera within this family (Lehtinen 1967; Levy 1996; Zhang et al. 2005; Santos and van Harten 2007). The main features of the genus *Agelena* include a grooved and complicated conductor and a spermathecal apophysis (Zhang et al. 2005). Lehtinen (1967), based on the work of Chamberlin and Ivie (1941, 1942), described six new genera from the Afrotropical region based on species previously included in this single genus. Roewer (1954, 1955) and Benoit (1978) also did revision work and reported *Agelena* on the Ethiopian and East African fauna respectively (Dippenaar-Schoeman and Jocqué 1997). The main reason given for the massive revisionary work was the different copulatory organs despite the shared somatic characters such as the shape of the cephalothorax, arrangement of procurved eyes and the coloration of the cephalothorax (Lehtinen 1967; Levy 1996).

The genus *Mistaria* Lehtinen, 1967 was among the six genera erected by Lehtinen (1967) to accommodate species from *Agelena*. Its distinguishing characteristics include a long, spine-like embolus, lamella-like fulcrum, presence of epigynal teeth and three retrolateral spermathecal lobes (Santos and van Harten 2007; Kioko et al. 2018). So far, the genus has six described species, five of which were recently transferred from the genus *Agelena*. They include *Mistaria nyeupenyensi* Kioko & Li, 2018 (♂♀, Kenya) and the revised species as follows; *Mistaria fagei* (Caporiacco, 1949) (♀, Kenya); *Mistaria leucopyga* (Pavesi, 1883) (♂♀, Central, East Africa, Yemen); *Mistaria leucopyga nian-garensis* (Lessert, 1927) (♀, East Africa); *Mistaria nairobi* (Caporiacco, 1949) (♂♀, Central, East Africa); *Mistaria zorica* (Strand, 1913) (♀, Central, East Africa) (World Spider Catalog 2019).

In this study, 11 *Agelena* species from various African countries are redescribed and their transfer to the genus *Mistaria* is proposed: *M. jaundea* (Roewer, 1955), comb. nov. (♂, Cameroon), *M. jumbo* (Strand, 1913), comb. nov. (♂♀, Central Africa), *M. kiboschensis* (Lessert, 1915), comb. nov. (♂♀, Central & East Africa), *M. keniana* (Roewer, 1955), comb. nov. (♀, Kenya), *M. lawrencei* (Roewer, 1955), comb. nov. (♀, Zimbabwe), *M. longimamillata* (Roewer, 1955), comb. nov. (♀, Mozambique), *M. moschiensis* (Roewer, 1955), comb. nov. (♀, Tanzania), *M. mossambica* (Roewer, 1955), comb. nov. (♀, Mozambique), *M. nyassana* (Roewer, 1955), comb. nov. (♀, Malawi), *M. teteana* (Roewer, 1955), comb. nov. (♂, Mozambique) and *M. zuluana* (Roewer, 1955), comb. nov. (♀, South Africa).



## Materials and methods

All spiders were preserved in 75% alcohol. Specimens were examined and measured using a LEICA M205C stereomicroscope. Images were captured using an Olympus C7070 wide zoom camera mounted on an Olympus SZX12 stereomicroscope. Male and female copulatory organs were dissected from the body and photographed separately. Epigynes were cleaned by first removing the tissues using a needle then boiling in 10% potassium hydroxide for 3–5 minutes. Leg measurements are given as follows: Total length (femur, patella and tibia, metatarsus, tarsus). All measurements are reported in millimeters. References to figures in the cited papers are listed in lowercase (fig. or figs); figures from this paper are noted with an initial capital (Fig. or Figs). Type material from the Senckenberg Research Institute in Frankfurt, Germany (SMF) was re-examined. Other museums where types are deposited are: Museo Civico di Storia Naturale “Giacomo Doria”, Genova (G. Doria) (MCSN) and Muséum d'histoire naturelle de Genève, Switzerland.

The abbreviations used in the paper include: ALE, anterior lateral eye; AME, anterior median eye; AME–ALE, distance between AME and ALE; AME–AME, distance between the two AME; AME–PME, distance between AME and PME; ALE–PLE, distance between ALE and PLE; C, conductor; Cb, cymbium; CD, copulatory duct; CF, cymbial furrow; E, embolus; Ed, epigyne delimiting edge (anterior); EIg, extended inward growth; Eo, embolic outgrowth; ET, epigynal teeth; F, fulcrum; FD, fertilisation duct; LTA, lateral tibial apophysis; MA, median apophysis; Ml, median lobe of spermatheca; PA, patella apophysis; Pl, posterior lobe of spermatheca; PLE, posterior lateral eyes; PME, posterior median eyes; PME–PLE, distance between PME and PLE; PME–PME, distance between the two PME; RTA, retrolateral tibial apophysis; S, spermatheca; T, tegulum; Vde, vulva delimiting edge (anterior). Apart from the eye abbreviations which are used in the text, all other abbreviations are cited in the figures. Labeling of figures follows Santos and van Harten (2007) and Zhang et al. (2005).

## Taxonomy

**Family:** Agelenidae C.L. Koch, 1837

**Subfamily:** Ageleninae C.L. Koch, 1837

**Tribe:** Agelenini Lehtinen, 1967

### *Mistaria* Lehtinen, 1967

*Mistaria leucopyga* (Pavesi, 1883) (Type species).

*Agelena leucopyga* Pavesi, 1883: 41–42 (♀). No information on type locality. Not examined.

**Diagnosis.** Males of the genus *Mistaria* can be separated from those of *Agelena* by the presence of a large translucent fulcrum in the former species (Fig. 1B) which is



absent in *Agelena* species; a spine-like embolus and thumb-like conductor in *Mistaria* (Fig. 1B) compared to a short, thick and grooved conductor in *Agelena* species (see fig. 5 in Zhang et al. 2005). Females can be separated by the absence of spermathecal apophysis in *Mistaria* (Fig. 2A) and absence of epigynal teeth in the females of *Agelena* (see fig. 3 in Zhang et al. 2005). *Mistaria* shares similarities with three other genera from the subfamily Ageleninae i.e *Agelescape* Levy, 1996, *Hololena* Chamberlin & Gertsch, 1929 and *Rualena* Chamberlin & Ivie, 1942. The shared characters include the presence of a fulcrum in the palp of males and epigine teeth in the females (Lehtinen 1967; Maya-Morales and Jiménez 2016). Males of *Mistaria* can be distinguished from those of *Agelescape* by the absence of a tegular apophysis between the conductor and the median apophysis and two patella apophyses present in *Mistaria* (see fig. 1 in Guseinov et al. 2005; Fig. 1B, C); from the males of *Hololena* by the presence of a patella apophysis which is absent in the latter (Fig. 1C) and from the males of *Rualena* by the absence of conductor projections in the former genus (see fig. 12 in Maya-Morales and Jiménez 2016). Females of *Mistaria* can be separated from those of *Agelescape* by the absence of a scape found in the latter genus (see fig. 13 in Guseinov et al. 2005); from those of *Hololena* by the more posterior position in the epigynal teeth in the latter genus (see fig. 8 in Chamberlin and Ivie 1942) and from those of *Rualena* by the absence of copulatory openings and hyaline spurs in the former genus (see fig. 40 in Maya-Morales and Jiménez 2016).

**Description.** See Kioko et al. 2018: 112

**Type species.** *Mistaria leucopyga* (Pavesi, 1883) from Ethiopia.

**Note.** The type species was not examined. The author of the type species Pavesi (1883) did not specify the exact locality of the species, hence descriptions were based on the work of Santos and van Harten (2007) which was the most recent paper and in which the authors examined the lectotype from Ethiopia: Mahal-Uonz, April 1887, Let-Marefià, July 1880 or Guiagaguè, 1887.

***Mistaria jaundea* (Roewer, 1955), comb. nov.**

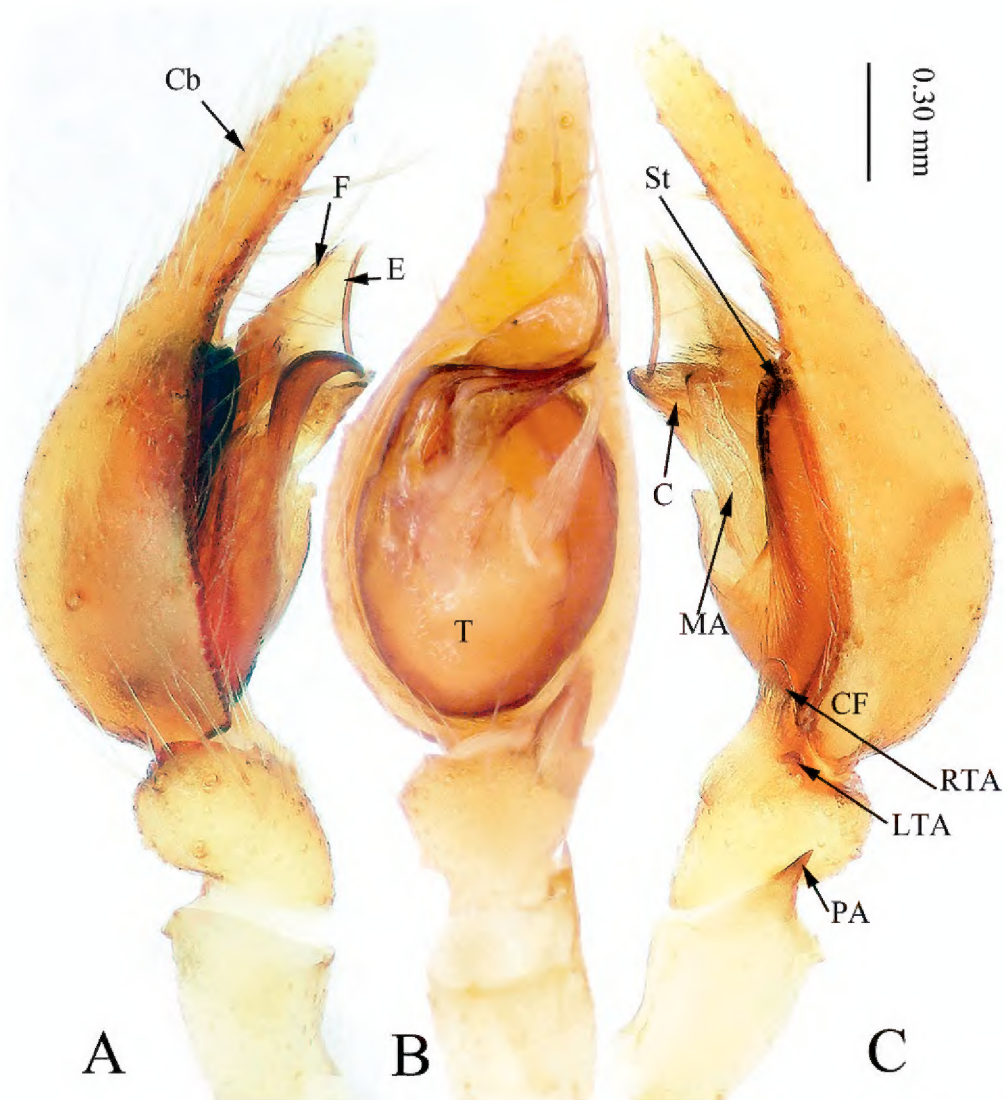
Figs 1, 12D, 13

*Agelena jaundea* Roewer, 1955: 69.

**Type material examined.** Holotype ♂, Cameroon, Jaunde (Yaoundé), 1953, Coll. C.F. Roewer (SMF 9906852, SMF 13664: microscopic slide, left palp).

**Diagnosis.** *Mistaria jaundea* comb. nov. and *M. nairobi* have the retrolateral tibial apophysis to lateral tibial apophysis ratio as 3:1 (see fig. 2B in Kioko et al. 2018; Fig. 1B). They can, however, be distinguished by the absence of an embolic outgrowth in *M. jaundea* comb. nov. (see fig. 2B in Kioko et al. 2018; Fig. 1B). *M. jaundea* can be separated from *M. nyeupenyensi* by body size and coloration which is smaller and black and white in *M. nyeupenyensi* (see fig. 6A in Kioko et al. 2018) compared to medium and cream-yellow in *M. jaundea* comb. nov. (Fig. 12D).





**Figure 1.** Palp of *Mistaria jaundea*, holotype male **A** prolateral view **B** ventral view **C** retrolateral view. C, conductor; Cb, cymbium; CF, cymbium furrow; E, embolus; F, fulcrum; LTA, prolateral tibial apophysis; MA, median apophysis; PA, patella apophysis; RTA, retrolateral tibial apophysis, ST, sub tegulum; T, tegulum.

**Redescription.** Total length 7.38. Carapace 3.53 long 2.88 wide. Abdomen 3.85 long 2.24 wide. Abdomen 3.85 long 2.24 wide. Habitus as in Fig. 12D. Carapace yellow, four black lateral bands, fovea 1/5 the length of the carapace. Cephalic region brown. Eye sizes and interdistances: AME 0.16, ALE 0.25, PME 0.19, PLE 0.22, AME–AME 0.13, AME–PME 0.25, ALE–PLE 0.09, PME–PME 0.09, PME–PLE 0.13. Chelicerae brown. Labium and endites brown with white apex. Labium 2/3 length of endite. Legs yellow. Leg measurements: I 14.11 (3.53, 4.81, 3.53, 2.24), II 13.15 (3.53, 4.17, 3.21, 2.24), III 12.51 (3.21, 3.85, 3.53, 1.92), IV 15.71 (4.17, 4.49, 4.81, 2.24). Abdomen ovoid, cream-yellow, two black horizontal parallel lines. Spinnerets cream-yellow.

Palp as in Fig. 1A–C. Cymbium 1.5 long, slender, yellow, tip about 1/3 length of cymbium (Fig. 1B). Cymbium furrow 1/6 length of cymbium. Retrolateral tibial apophysis same length as tibia. Size ratio of retrolateral tibial apophysis to lateral tibial apophysis 3:1. Patella apophysis cone-shaped, same length as tibia, tip brown, proximal end yellow. Anterior edge of sub-tegulum raised at point of attachment to the fulcrum (Fig. 1A). Median apophysis non-sclerotized, curved at distal end (Fig. 1B).



Embolus originating centrally, no embolic outgrowth, small non-sclerotized basal membrane (Fig. 1B).

Female unknown.

**Distribution.** Cameroon (Fig. 13).

***Mistaria jumbo* (Strand, 1913), comb. nov.**

Figs 2, 3, 12B, 13

*Agelena jumbo* Strand 1913: 407.

*Agelena jumbo* Roewer, 1955: 37.

**Material examined.** Holotype ♀, Rwanda, 1907 (SMF 9907948); Palp, Democratic Republic of the Congo, Kessenji, 1 ♂, September 1907 (SMF 9907948: microscopic slide, left palp).

**Diagnosis.** *Mistaria jumbo* comb. nov. can be distinguished from the type *M. leucopyga* by the shape of the anterior lobe of the epigyne which has an extended inward growth lacking in the former species (Fig. 2B). The male of this species can be distinguished from other *Mistaria* species by having two embolic outgrowths (Fig. 3A) whereas *M. leucopyga* and *M. nairobi* have a single embolic outgrowth while in *M. nyeupenyensi* it is absent (see fig. 1 in Santos and van Harten 2007; figs 2B, 5E in Kioko et al. 2018).

**Redescription. Female.** Total length 11.00. Carapace 3.90 long 3.53 wide. Abdomen 7.10 long 4.49 wide. Habitus as in Fig. 12B. Carapace as long as wide, brown-yellow, cephalic region dark brown. Long groove from PME to fovea. Fovea short. Eye sizes and interdistances: AME 0.26, ALE 0.26, PME 0.20, PLE 0.24, AME–AME 0.08, AME–PME 0.28, ALE–PLE 0.08, PME–PME 0.20, PME–PLE 0.24. Chelicerae brown. Labium and endites brown, apex white. Labium 2/3 length of endites. Sternum as long as wide, brown-yellow. Legs brownish-yellow. Leg measurements: II 13.23 (3.53, 4.49, 3.29, 1.92), III 12.80 (3.50, 4.17, 3.21, 1.92), IV 15.40 (4.5, 5.13, 3.85, 1.92). Leg I missing. Abdomen oval, creamish-yellow, three chevron marks dorsally, two black parallel stripes (Fig. 12B). Spinnerets cream yellow.

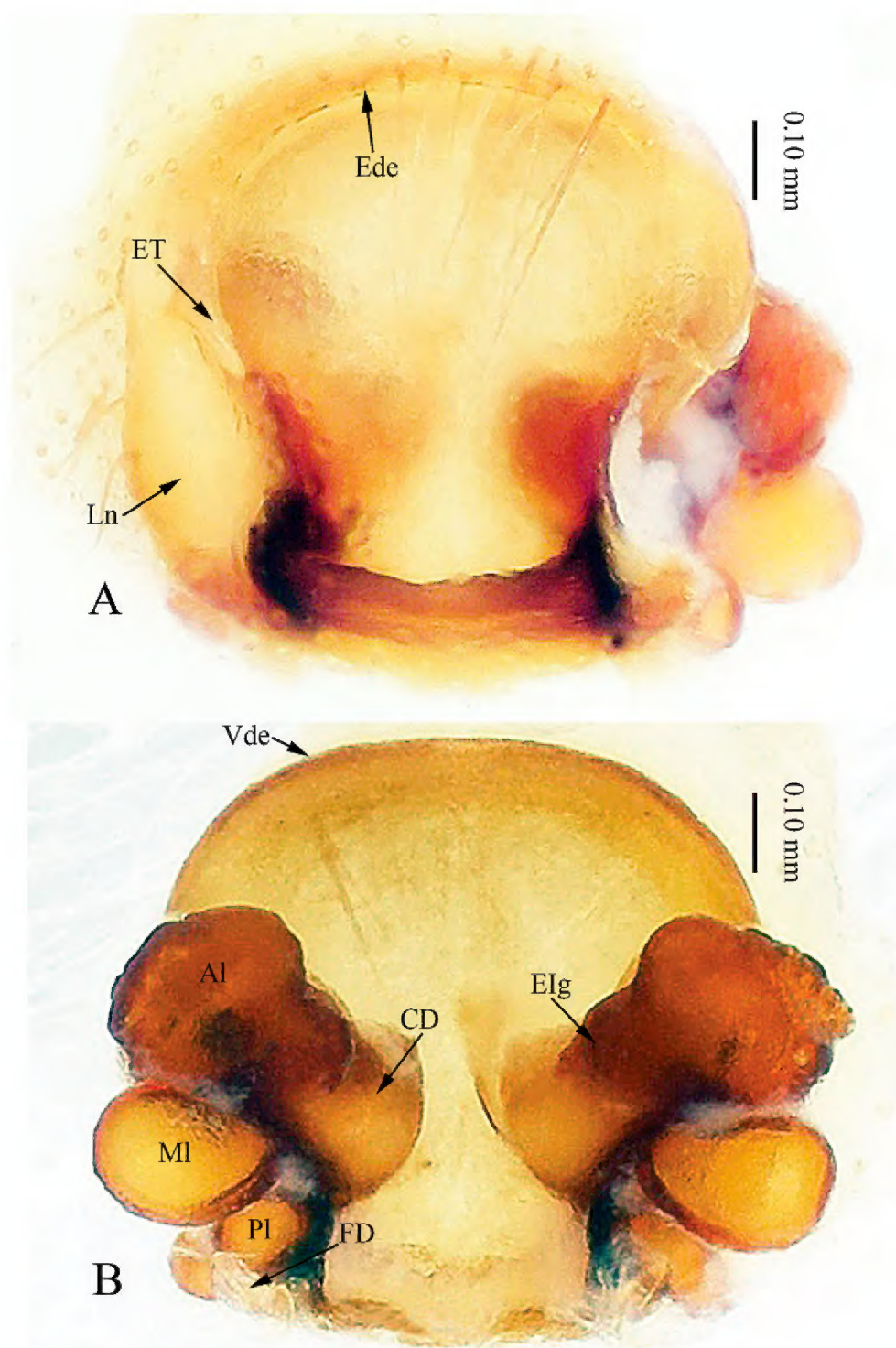
Epigyne as in Fig. 2A, B. Teeth wide posteriorly and narrow distally, about 1/2 the length of the lateral notch, central origin (Fig. 2A). Copulatory duct 0.1 apart, centrally projected, yellow (Fig. 2B). Size of spermathecal lobes decrease posteriorly, anterior lobe round with an extension inwards (Fig. 2B).

Male body not available for redescription. See Roewer, 1955: 37–38.

Palp as in Fig. 3A, B. Cymbium 1.7 long, short and thick, brown-yellow, tip 1/4 length of cymbium (Fig. 3A). Median apophysis non-sclerotized. Ratio of retrolateral tibial apophysis to lateral tibial apophysis 4:1. Patella twice the size of the tibia. Patella apophysis cone shaped, 1/2 length of tibia. Embolus originating centrally, two embolic outgrowths, sharp tip (Fig. 3A).

**Distribution.** Democratic Republic of the Congo, Rwanda (Fig. 13).





**Figure 2.** *Mistaria jumbo*, holotype female **A** epigyne, ventral view **B** vulva, dorsal view. Al, anterior lobe of spermatheca; CD, copulatory duct; Ede, epigyne delimiting edge (anterior); Elg, extended inward growth; ET, epigynal teeth; FD, fertilization duct; Ln, lateral notches; MI, median lobe of spermatheca; PI, posterior lobe of spermatheca; Vde, vulva delimiting edge (anterior).

***Mistaria keniana* (Roewer, 1955), comb. nov.**

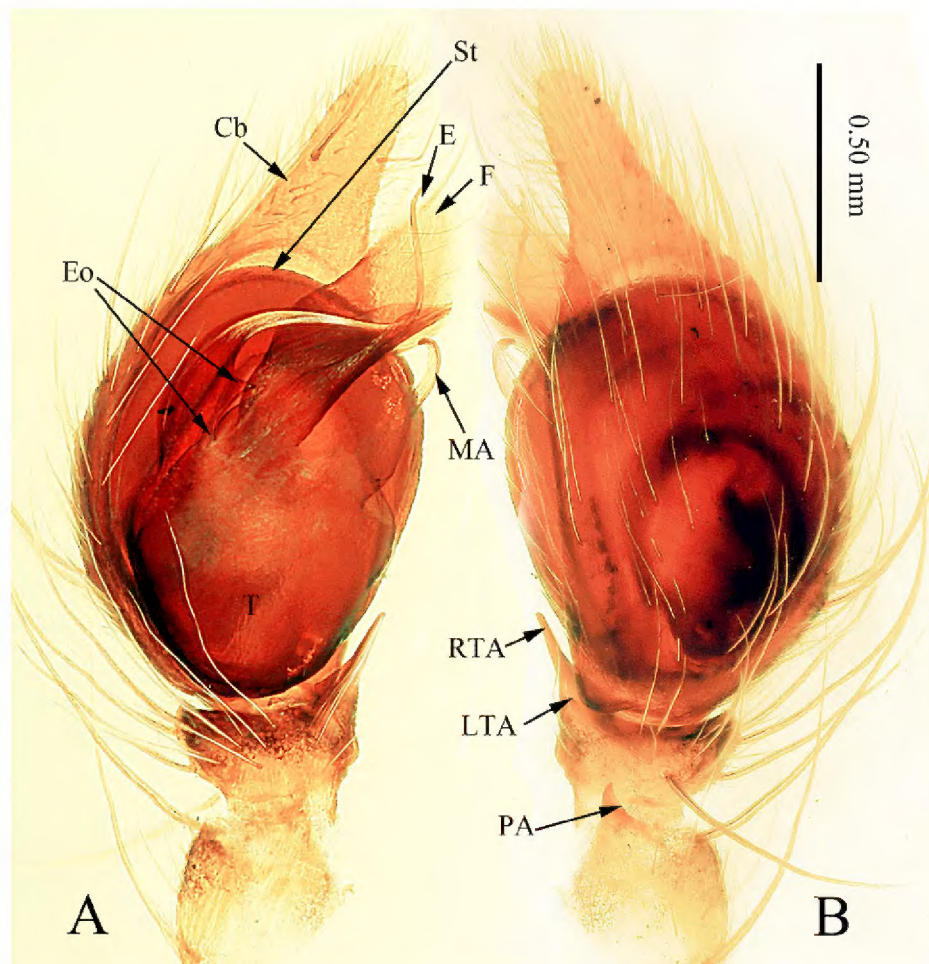
Figs 4, 12G, 13

*Agelena keniana* Roewer 1955: 28.

**Type material examined.** Holotype ♀, Kenya, Nairobi, 1953, Coll. C.F. Roewer (SMF 9910495).

**Diagnosis.** *M. keniana* comb. nov. can be separated from *M. leucopyga* by the absence of a septum and smaller copulatory ducts in the latter species (see figs 3, 4 in Santos and van Harten 2007) compared to a septum present and larger copulatory ducts in





**Figure 3.** Palp of *Mistaria jumbo*, syntype male **A** prolateral view **B** retrolateral view. C, conductor; Cb, cymbium; E, embolus; F, fulcrum; LTA, prolateral tibial apophysis; MA, median apophysis; PA, patella apophysis; RTA, retrolateral tibial apophysis; ST; subtegulum; T, tegulum.

the former species (Fig. 4A, B). It can be distinguished from *M. fagei* by the posteriorly projected and heavily sclerotized copulatory ducts (see fig. 1B in Kioko et al. 2018) compared to centrally protruding and lightly sclerotized in *M. keniana* comb. nov. (Fig. 4B) and also by the ovoid anterior lobe compared to round lobe in the former species.

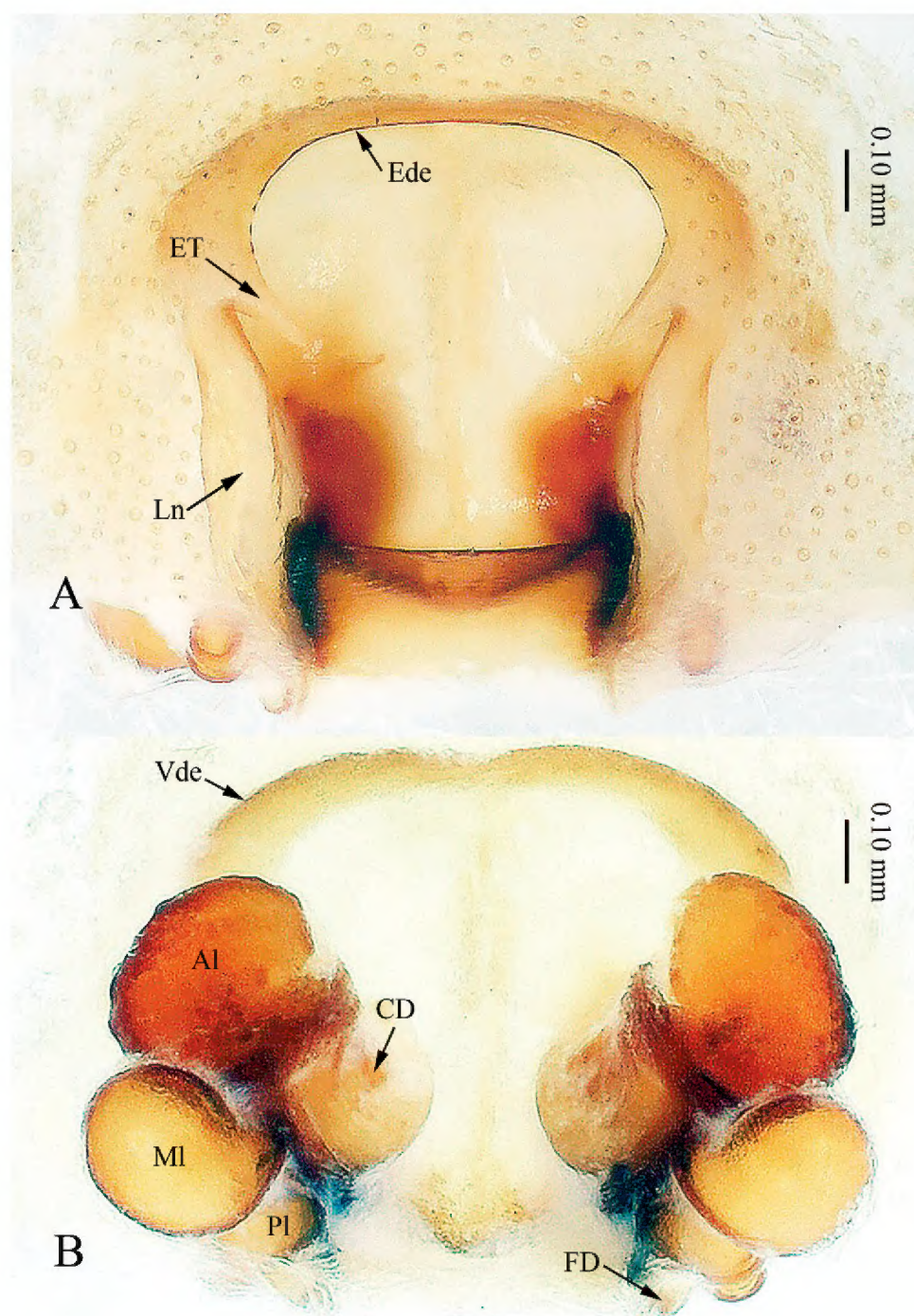
**Redescription.** Total length 11.54. Carapace 5.45 long, 3.85 wide. Abdomen 6.09 long 3.53 wide. Habitus as in Fig. 12G. Carapace longer than wide, brown-yellow, cephalic region blackish-brown. Fovea long, central, four lateral black lines. Eye sizes and interdistances: AME 0.26, ALE 0.28, PME 0.24, PLE 0.28, AME–AME 0.14, AME–PME 0.31, ALE–PLE 0.13, PME–PME 0.20, PME–PLE 0.31. Chelicerae brown. Labium longer than wide,  $\frac{3}{4}$  length of endites, brown. Endites brown. Sternum brownish-yellow. Legs brown-yellow. Leg measurements: I– (4.48, 5.13, 3.53, –), II 13.73 (4.49, 4.11, 3.21, 1.92), III– (4.17, 3.85, 2.88, –), IV 15.38 (4.81, 4.49, 3.84, 2.24). Tarsi I & III missing. Abdomen ovoid, creamish-yellow, two black parallel lines, three chevron marks. Spinnerets creamish-yellow, first segment of posterior spinnerets and anterior spinnerets equal length.

Epigyne as in Fig. 4A, B. Teeth and anterior delimiting edge form a wide, perfect concave shape. Teeth wider posteriorly. Septum present in vulva (Fig. 4B). Copulatory ducts central, close to each other. Anterior region wider than posterior (Fig. 4A). Anterior lobe of the spermathecae round, size of the lobes decreasing posteriorly.

Male unknown.

**Distribution.** Kenya (Fig. 13).





**Figure 4.** *Mistaria keniana*, holotype female **A** epigyne, ventral view **B** vulva, dorsal. Al, anterior lobe of spermatheca; CD, copulatory duct; Ede, epigyne delimiting edge (anterior); ET, epigynal teeth; FD, fertilization duct; Ln, lateral notches; MI, median lobe of spermatheca; Pl, posterior lobe of spermatheca; Vde, vulva delimiting edge (anterior).

***Mistaria kiboschensis* (Lessert, 1915), comb. nov.**

Figs 5, 12A, 13

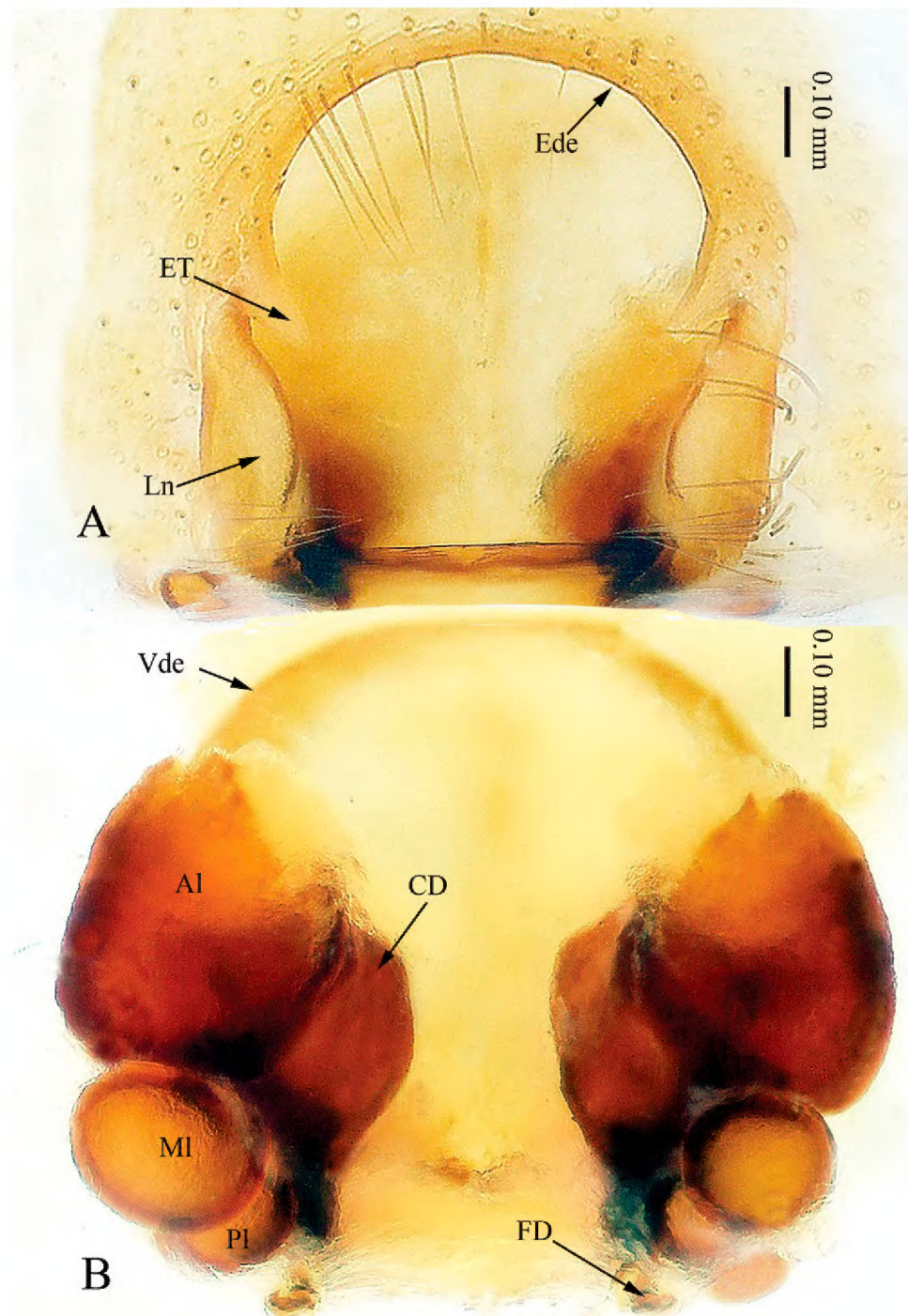
*Agelena leucopyga kiboschensis* Lessert, 1915: 487.

*Agelena kiboschensis* Roewer, 1955: 41.

**Type material.** *Agelena leucopyga kiboschensis*, Tanzania, Kiboscho, 3000–4000 m, (type ♀, no date), Kibonoto, (1 ♂, type, X), 1915, Lessert, Muséum d'histoire naturelle de Genève, Switzerland (not examined).

**Other material examined.** Rwanda, 2♀, 1953, Coll. C.F. Roewer (SMF 9907841; 9907951).





**Figure 5.** *Mistaria kiboschensis*, female from Rwanda **A** epigyne, ventral view **B** vulva, dorsal view. AI, anterior lobe of spermatheca; CD, copulatory duct; Ede, epigyne delimiting edge (anterior); ET, epigynal teeth; FD, fertilization duct; Ln, lateral notches; MI, median lobe of spermatheca; PI, posterior lobe of spermatheca; Vde, vulva delimiting edge (anterior).

**Diagnosis.** *M. kiboschensis* comb. nov. can be distinguished from *M. leucopyga* by the larger copulatory ducts (Fig. 5B) compared to reduced ones in the latter (see fig. 4 in Santos and van Harten 2007). It can also be separated by the missing white spot posteriorly on the dorsal side of the abdomen (Fig. 12A) which is present in *M. leucopyga* (see fig. 5a in Roewer 1955). This species can also be separated from *M. moschiensis* comb. nov. by the shape of the median lobe which is small and round in *M. kiboschensis* comb. nov. (Fig. 5B) compared to larger and ovoid in *M. moschiensis* comb. nov. (Fig. 7B). The copulatory duct originates posteriorly and is projected centrally in *M. kiboschensis* comb. nov. (Fig. 5B) compared to central origin and anteriorly projected in *M. moschiensis* comb. nov. (Fig. 7B).



**Redescription. Female.** Total body length 12.82. Carapace 5.77 long, 4.17 wide. Abdomen 7.05 long, 4.49 wide. Habitus as in Fig. 12A. Carapace longer than wide, brownish-yellow, four lateral bands, long groove from posterior median eyes to fovea. Fovea short. Eye sizes and interdistances: AME 0.25, ALE 0.27, PME 0.22, PLE 0.27, AME–AME 0.13, AME–PME 0.31, ALE–PLE 0.09, PME–PME 0.22, PME–PLE 0.25. Chelicerae dark brown. Endite and labium brown, apex white. Labium longer than wide. Sternum longer than wide, brown. Legs brownish-yellow. Leg measurements: I 16.66 (4.48, 6.09, 3.85, 2.24), II 15.71 (4.17, 5.77, 3.85, 1.92), III 14.88 (4.49, 4.62, 3.85, 1.92), IV 19.22 (5.76, 6.09, 5.13, 2.24). Abdomen oval, creamish-yellow, three chevron marks, two black parallel lines dorsally. Spinnerets cream-yellow.

Epigyne as in Fig. 5A, B. Teeth wide posteriorly and narrow distally, same length as the lateral notch. Anterior epigyne delimiting edge concave (Fig. 5A). Copulatory ducts heavily sclerotized, centrally protruding (Fig. 5B). Size of the three spermathecal lobes decrease posteriorly. Spermathecal lobes round.

Male not available for redescription. See Roewer 1955.

**Distribution.** Central & East Africa (Fig. 13).

***Mistaria lawrencei* (Roewer, 1955), comb. nov.**

Figs 6, 12I, 13

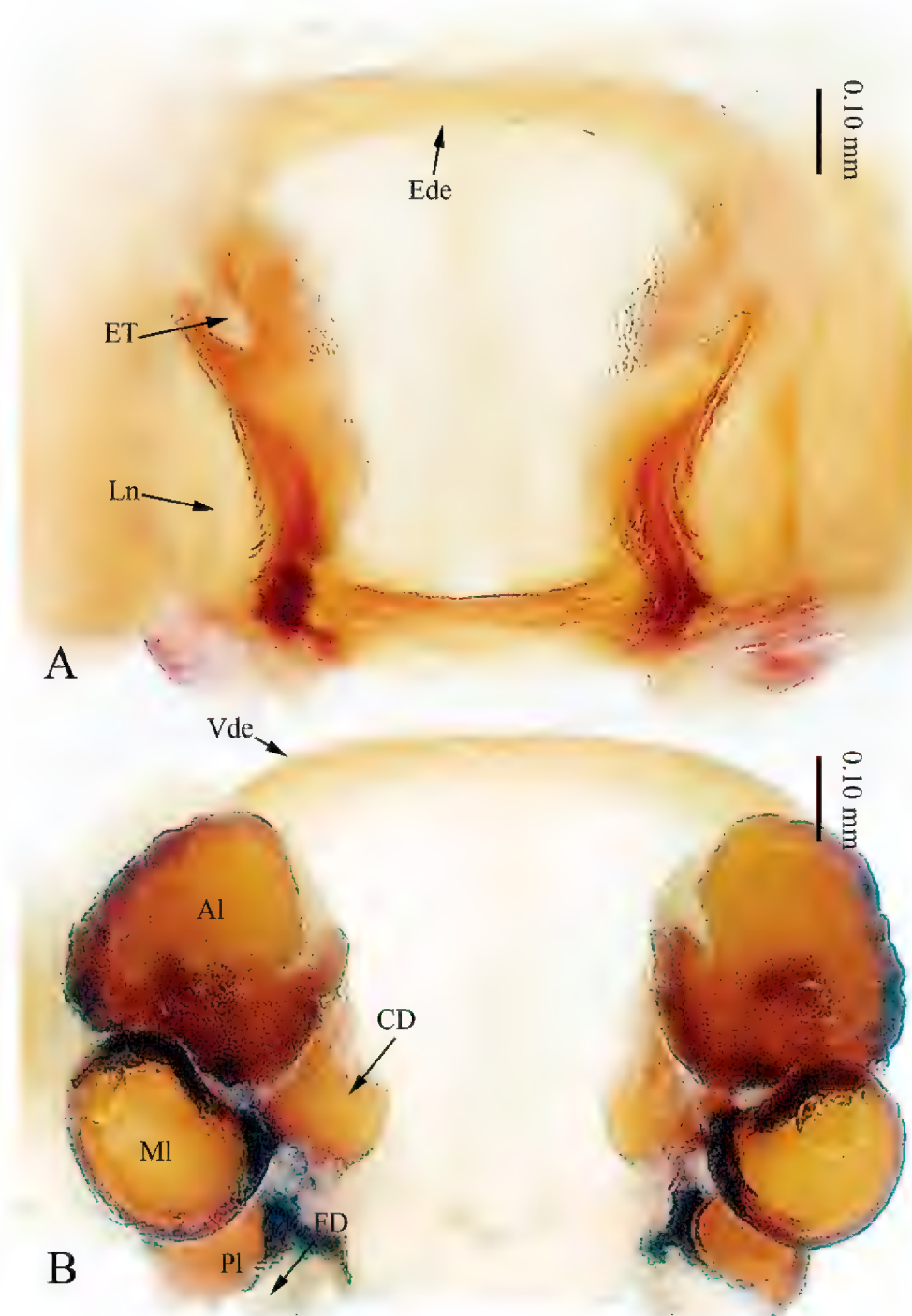
*Agelena lawrencei* Roewer, 1955: 60.

**Type material examined.** Holotype ♀, Zimbabwe, near Salisbury [=Harare], 1953, Coll. C.F. Roewer (SMF 9906638).

**Diagnosis.** *M. lawrencei* comb. nov. and *M. mossambica* comb. nov. share characteristics such as the shape of the anterior lobe, triangular centrally projected copulatory ducts and wide concave epigyne anterior delimiting edge (Figs 6B, 8B). The two species can be distinguished by the shape of the epigynal teeth which are thick in *M. lawrencei* comb. nov. (Fig. 6A) compared and slender in *M. mossambica* comb. nov. (Fig. 8A). The copulatory ducts are also large and close together in *M. mossambica* comb. nov. (Fig. 8B) compared to smaller and further apart in *M. lawrencei* comb. nov. (Fig. 6B). The two species can also be separated by the length to width size ratio of the epigyne which is 0.6:0.6 in *M. lawrencei* compared to 0.7:0.5 in *M. mossambica* comb. nov.

**Redescription.** Total length 9.62. Carapace 4.49 long 3.85 wide. Abdomen 5.13 long 3.21 wide. Habitus as in Fig. 12I. Carapace longer than wide, yellow, four lateral black lines. Fovea long. Eye sizes and interdistances: AME 0.25, ALE 0.27, PME 0.20, PLE 0.25, AME–AME 0.09, AME–PME 0.31, ALE–PLE 0.12, PME–PME 0.19, PME–PLE 0.28. Chelicerae brown-yellow. Labium 2/3 length of endites, yellow. Endites yellow. Sternum shield shaped, yellow. Legs yellow numerous spines. Leg measurements: I 14.43 (3.85, 4.81, 3.53, 2.24), II 15.07 (4.17, 5.13, 3.53, 2.24), III





**Figure 6.** *Mistaria lawrencei*, holotype female **A** epigyne, ventral view **B** vulva, dorsal view. Al, anterior lobe of spermatheca; CD, copulatory duct; Ede, epigyne delimiting edge (anterior); ET, epigynal teeth; FD, fertilization duct; Ln, lateral notches; MI, median lobe of spermatheca; Pl, posterior lobe of spermatheca; Vde, vulva delimiting edge (anterior).

13.15 (3.85, 4.17, 3.21, 1.92), IV 16.67 (4.81, 5.13, 4.49, 2.24). Abdomen ovoid, creamish-yellow, two parallel black lines. Spinnerets yellow.

Epigyne as in Fig. 6A, B. Teeth same length as lateral notches, wide at proximal end and thin distally. Anterior delimiting edge concave, epigyne opening rectangular. Vulva anterior delimiting edge slightly concave. Septum present (Fig. 6A). Copulatory ducts central origin, widely separated. Spermathecal lobes decreasing in size posteriorly, anterior lobe roundish.

Male unknown.

**Distribution.** Zimbabwe (Fig. 13).



***Mistaria longimamillata* (Roewer, 1955), comb. nov.**

Figs 12K, L, 13

*Agelena longimamillata* Roewer 1955: 58.

**Type material examined.** Holotype ♀, Mozambique, Tete, 1953, Coll. C.F. Roewer (SMF 9909997).

**Diagnosis.** *M. longimamillata* comb. nov. and *M. zorica* have the distal segment of posterior spinnerets twice the size of the anterior spinnerets. The two species can be distinguished by the swollen tarsi of the palp in *M. longimamillata* comb. nov (Fig. 12K, L) compared to straight in *M. zorica* (see fig. 4C in Kioko et al. 2018). *M. zorica* is also smaller compared to the medium sized *M. longimamillata* comb. nov.

**Redescription.** Total length 8.34. Carapace 3.85 long 3.21 wide. Abdomen 4.49 long 2.56 wide. Habitus as in Fig. 12K, L. Carapace wider than long, yellow, lateral bands present. V-neck like pattern present with white flower-like pattern. Cephalic region brown. Tarsi of the palp wider than the rest of the palp. Fovea short. Eye sizes and interdistances: AME 0.19, ALE 0.22, PME 0.16, PLE 0.17, AME–AME 0.09, AME–PME 0.23, ALE–PLE 0.08, PME–PME 0.17, PME–PLE 0.19. Chelicerae brown. Labium 2/3 length of endites. Labium, endites, sternum and legs yellow. Leg measurements: I 17.31 (4.81, 5.45, 4.17, 2.88), II 15.39 (4.81, 4.49, 3.53, 2.56), III 15.70 (5.12, 4.17, 3.85, 2.56), IV 19.87 (5.13, 5.77, 6.09, 2.88). Abdomen yellow with black spots on each sides, wide cream band at the center. Posterior spinnerets long, distal segment twice the length of the proximal segment.

**Note.** The epigyne of this species was not available for redescription, it was missing in the vial. However, based on the diagram by Roewer 1955, the following deductions were made. Epigynal teeth long and pointed, longer than lateral notches, originating centrally. Anterior delimiting edge concave.

Male unknown.

**Distribution.** Mozambique (Fig. 13).

***Mistaria moschiensis* (Roewer, 1955), comb. nov.**

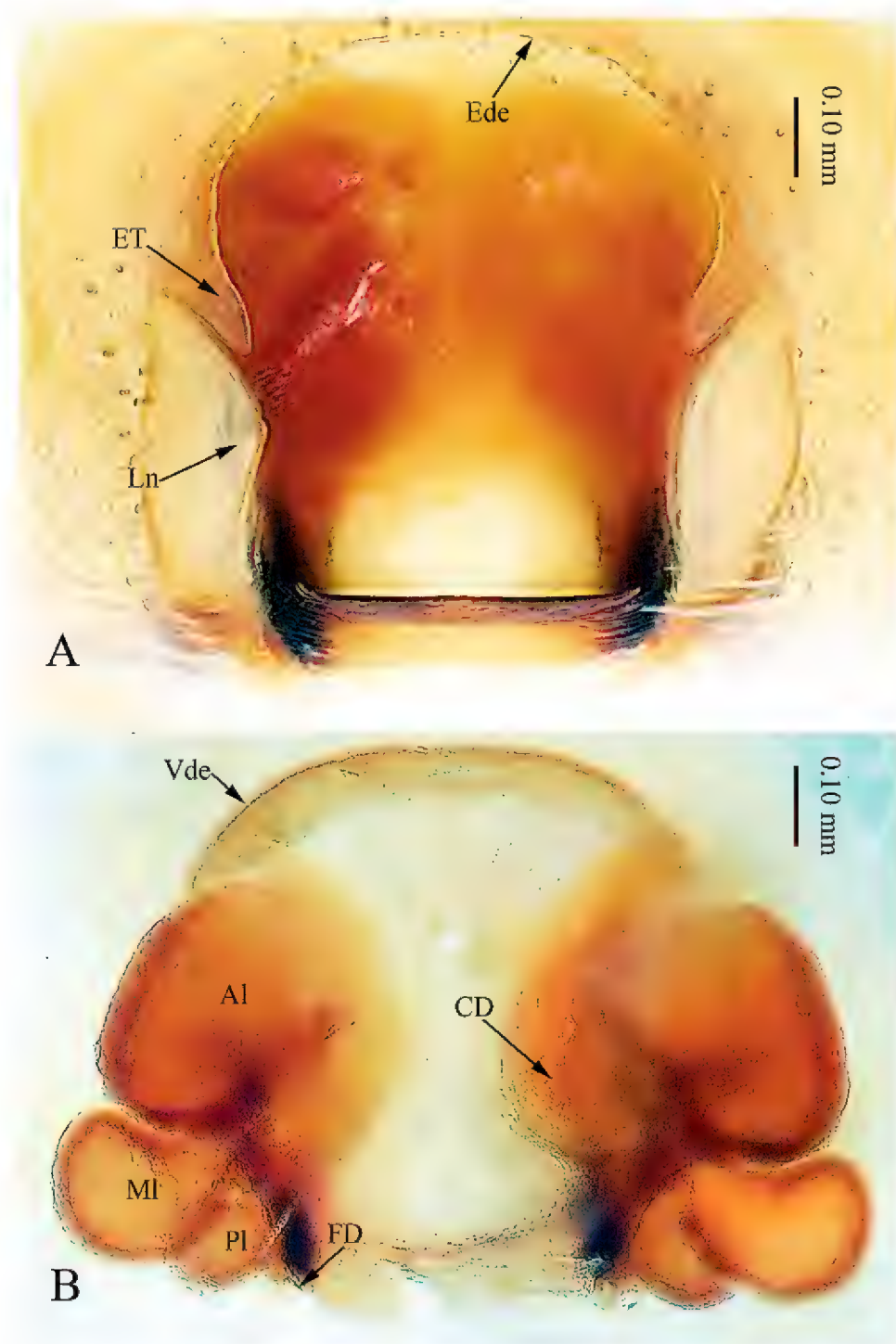
Figs 7, 12E, 13

*Agelena moschiensis* Roewer 1955: 35.

**Type material examined.** Holotype ♀, Tanzania, Moschi [=Moshi], 1953, Hartmann leg., Coll. C.F. Roewer (SMF 9910418). Paratype 1 ♀, Tanzania, Aruscha [=Arusha], Hartmann leg., Coll. C.F. Roewer, 1953 (SMF 9907949).

**Diagnosis.** *M. moschiensis* comb. nov. and *M. kiboschensis* both have horizontally ovoid anterior lobes of the spermatheca and deep concave epigyne anterior delimiting edges (Figs 5B, 7B). They can be distinguished by the position of the copulatory ducts





**Figure 7.** *Mistaria moschiensis*, holotype female **A** epigyne, ventral view **B** vulva, dorsal. Al, anterior lobe of spermatheca; CD, copulatory duct; Ede, epigyne delimiting edge (anterior); ET, epigynal teeth; FD, fertilization duct; Ln, lateral notches; Ml, median lobe of spermatheca; Pl, posterior lobe of spermatheca; Vde, vulva delimiting edge (anterior).

which are of central origin but protruding anteriorly in *M. moschiensis* comb. nov. (Fig. 7B) compared to posterior origin and projected centrally in *M. kiboschensis* (Fig. 5B). The shape of the median lobe is small and round in *M. kiboschensis* (Fig. 5B) compared to larger and ovoid in *M. moschiensis* comb. nov (Fig. 7B).

**Redescription.** Total length 9.30. Carapace 4.17 long 3.53 wide. Abdomen 5.13 long 3.21 wide. Habitus as in Fig. 12E. Carapace longer than wide, brownish-yellow, cephalic region dark brown, four pairs lateral bands. Fovea long. Eye sizes and interdistances: AME 0.23, ALE 0.25, PME 0.20, PLE 0.28, AME–AME 0.09, AME–PME 0.25, ALE–PLE 0.08, PME–PME 0.20, PME–PLE 0.22. Chelicerae blackish-brown. Labium  $\frac{3}{4}$  length of endites, brownish-yellow. Endites brownish-yellow. Sternum longer than wide, brown. Legs brownish-yellow. Leg measurements: I 13.35 (3.85, 4.49,



3.21, 1.80), II 13.15 (3.85, 4.49, 3.21, 1.60), III 12.19 (3.53, 3.85, 2.89, 1.92), IV 15.71 (4.49, 4.81, 4.49, 1.92). Abdomen ovoid, creamish-yellow, two parallel black lines, two chevron marks distally. Proximal segment of posterior spinnerets brown, distal segment cream (Fig. 12E).

Epigyne as in Fig. 7A, B. Teeth shorter than lateral notches. Anterior delimiting edge deep concave shape (Fig. 7A). Vulva anterior delimiting edge concave. Copulatory duct central origin but situated anteriorly. Anterior lobe wide horizontally ovoid shape, lobe sizes reduce posteriorly.

Male unknown.

**Distribution.** Tanzania (Fig. 13).

***Mistaria mossambica* (Roewer, 1955), comb. nov.**

Figs 8, 12F, 13

*Agelena mossambica* Roewer 1955: 56.

**Type material examined.** Holotype ♀, Mozambique, Tete, 1953, Coll. C.F. Roewer (SMF 9909999).

**Diagnosis.** *M. mossambica* comb. nov. strongly resembles *M. lawrencei* by sharing similar characters such as the shapes of the anterior lobe of the spermatheca and epigyne anterior delimiting edge and position of copulatory ducts (Figs 6B, 8B). The two species can be distinguished by the shape of the epigynal teeth which are thick in *M. lawrencei* (Fig. 6A) compared to slender in *M. mossambica* comb. nov. (Fig. 8A). The copulatory duct is also large and close together in *M. mossambica* comb. nov. (Fig. 8B) compared to smaller and further apart in *M. lawrencei* (Fig. 6B). These two species can also be separated by the length to width size ratio of the epigyne which is 0.6:0.6 in *M. lawrencei* compared to 0.7:0.5 in *M. mossambica* comb. nov.

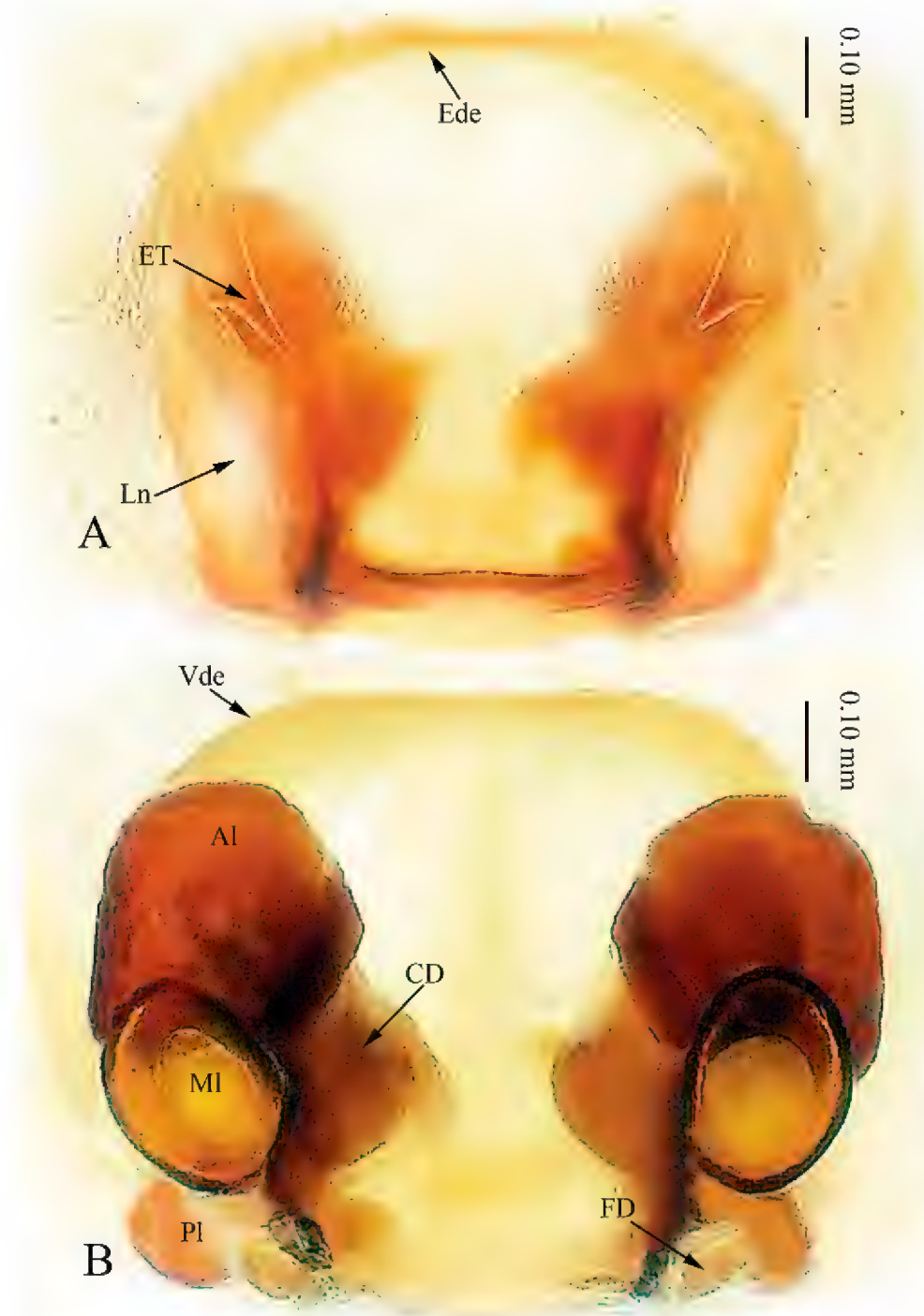
**Redescription.** Total length 9.62. Carapace 4.49 long 3.85 wide. Abdomen 5.13 long 3.53 wide. Habitus as in Fig. 12F. Carapace longer than wide, brownish-yellow, cephalic region blackish-brown. Fovea long, four lateral bands. Eye sizes and interdistances: AME 0.25, ALE 0.25, PME 0.19, PLE 0.25, AME–AME 0.10, AME–PME 0.28, ALE–PLE 0.08, PME–PME 0.19, PME–PLE 0.25. Chelicerae brown. Labium longer than wide, 3/4 length of the endites, brown. Endites brown, cream apex. Sternum brownish-yellow. Legs yellow. Leg measurements: I 15.71 (4.17, 5.45, 3.85, 2.24), II 13.47 (4.17, 4.49, 3.21, 1.60), III 14.75 (3.85, 4.49, 4.81, 1.60), IV 17.31 (4.49, 5.77, 4.81, 2.24). Abdomen yellow, with two longitudinal parallel brown lines. Spinnerets creamish-yellow (Fig. 12F).

Epigyne as in Fig. 8A, B. Teeth wide basally, narrowing to apex, equidistant to lateral notches (Fig. 8A). Epigyne anterior delimiting edge concave, vulva anterior edge almost straight. Copulatory duct central, triangular, close to each other (Fig. 8B). Anterior lobe with a flat exterior, twice the size of the median lobe and three times third lobe (Fig. 8B).

Male unknown.

**Distribution.** Mozambique (Fig. 13).





**Figure 8.** *Mistaria mossambica*, holotype female **A** epigyne, ventral view **B** vulva, dorsal. Al, anterior lobe of spermatheca; CD, copulatory duct; Ede, epigyne delimiting edge (anterior); ET, epigynal teeth; FD, fertilization duct; Ln, lateral notches; MI, median lobe of spermatheca; Pl, posterior lobe of spermatheca; Vde, vulva delimiting edge (anterior).

***Mistaria nyassana* (Roewer, 1955), comb. nov.**

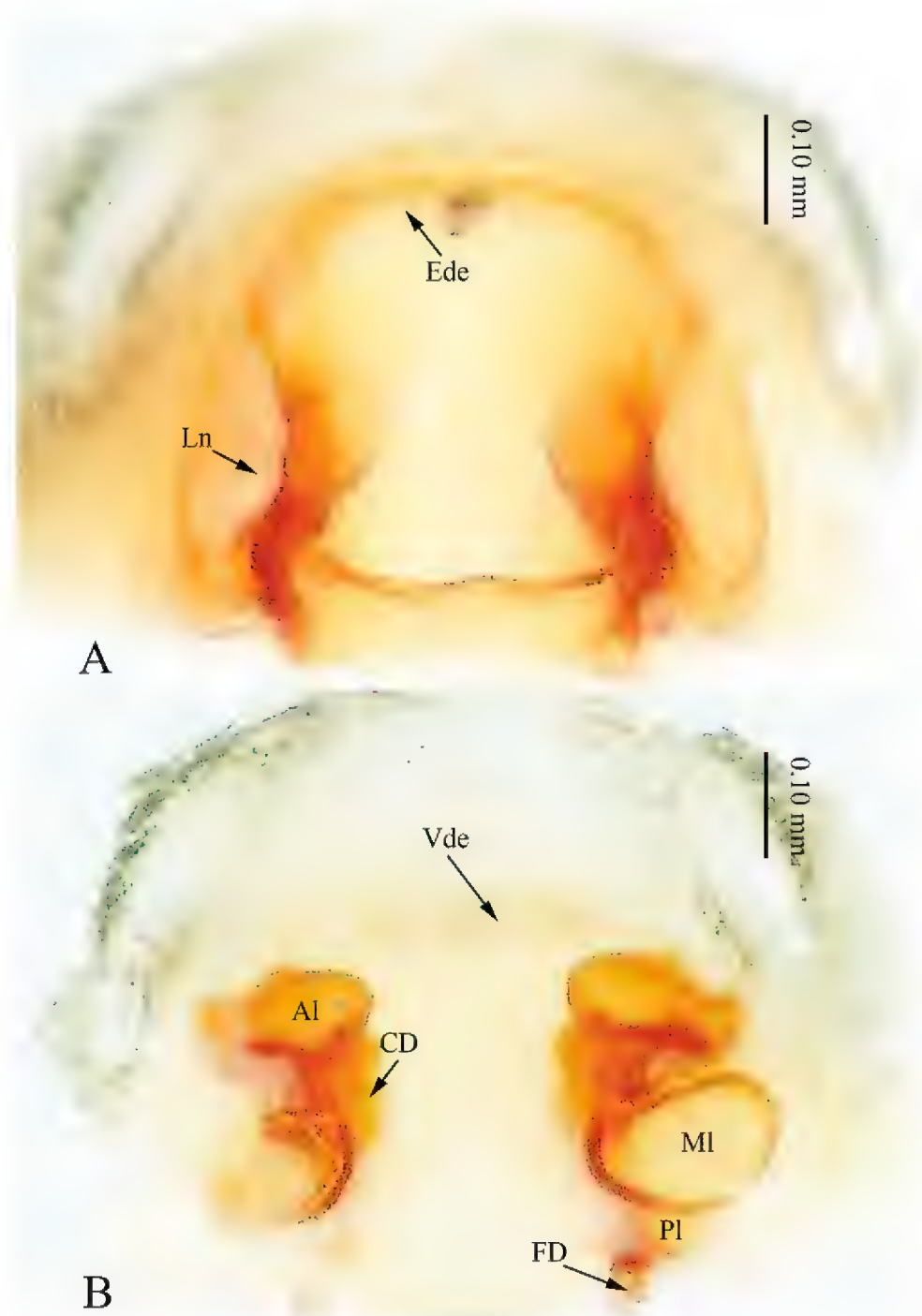
Figs 9, 12H, 13

*Agelena nyassana* Roewer 1955: 52.

**Type material examined.** Holotype ♀, Nyassaland [=Malawi], 1953, Coll. C.F. Roewer (SMF 9905260).

**Diagnosis.** *M. nyassana* comb. nov. can be distinguished from *M. zorica* and *M. zuluana* comb. nov. by the shape of the anterior lobe which is cichlid fish-shaped in this species (Fig. 9B) compared to ovoid in the latter two species (see fig. 4B in Kioko





**Figure 9.** *Mistaria nyassana*, holotype female **A** epigyne, ventral view **B** vulva, dorsal. Al, anterior lobe of spermatheca; CD, copulatory duct; Ede, epigyne delimiting edge (anterior); ET, epigynal teeth; FD, fertilization duct; Ln, lateral notches; MI, median lobe of spermatheca; Pl, posterior lobe of spermatheca; Vde, vulva delimiting edge (anterior).

et al. 2018) and the absence of a septum in the former species which is present in *M. zorica* (see fig. 4A, B in Kioko et al. 2018; Figs 9B, 11B). *M. nyassana* comb. nov. can also be distinguished from *M. zuluana* comb. nov. by the shape and distance of copulatory ducts which are reduced and further apart in *M. nyassana* comb. nov. (Fig. 9B) compared to clearly visible and close together in the latter species (Fig. 11B).

**Redescription.** Total length 6.10. Carapace 2.50 long 2.19 wide. Abdomen 3.60 long 2.60 wide. Habitus as in Fig. 12H. Carapace longer than wide, yellow suffused with black, four pairs of lateral bands, fovea short. Eye sizes and interdistances: AME 0.13, ALE 0.19, PME 0.13, PLE 0.18, AME–AME 0.06, AME–PME 0.20, ALE–PLE 0.08, PME–PME 0.14, PME–PLE 0.13. Chelicerae brown. Labium to endite length



ratio 1:2. Labium wider than long, yellow suffused with black. Endites yellow. Both endites and labium with white apex. Sternum as long as wide, yellow suffused with black, distinct cream median line. Legs yellow. Leg measurements: I 10.19 (2.50, 3.25, 2.88, 1.56) II 8.54 (2.13, 2.81, 2.00, 1.60), III 9.28 (2.40, 3.08, 2.40, 1.40), IV 11.20 (3.20, 3.20, 3.00, 1.80). Abdomen brown-yellow two parallel brownish lines present ventrally. Proximal segment of the posterior spinnerets brown, distal segment yellow (Fig. 12H).

Epigyne as in Fig. 9A, B. Epigynal teeth missing. Anterior delimiting edge concave (Fig. 9A). Copulatory ducts reduced, widely separated (Fig. 9B). Anterior lobe cichlid fish shaped (Fig. 9B).

Male unknown.

**Distribution.** Malawi (Fig.13).

***Mistaria teteana* (Roewer, 1955), comb. nov.**

Figs 10, 12C,13

*Agelena teteana* Roewer 1955: 59.

**Type material examined.** Holotype ♂, Mozambique, Tete, 1953, Coll. C.F. Roewer (SMF 9909996, SMF 13666, microscopic slide: left palp).

**Diagnosis.** *Mistaria teteana* comb. nov. can be distinguished from *M. nairobi* by the size ratio of the retrolateral tibial apophysis to lateral tibial apophysis which is 5:1 (Fig. 10B) compared to 3:1 in the latter (see fig. 2B in Kioko et al. 2018). It can be separated from *M. leucopyga* by the thick and rounded cymbium (Fig. 10 A, B) compared to long and slender in the latter species (see figs 1, 2 in Santos and van Harten 2007).

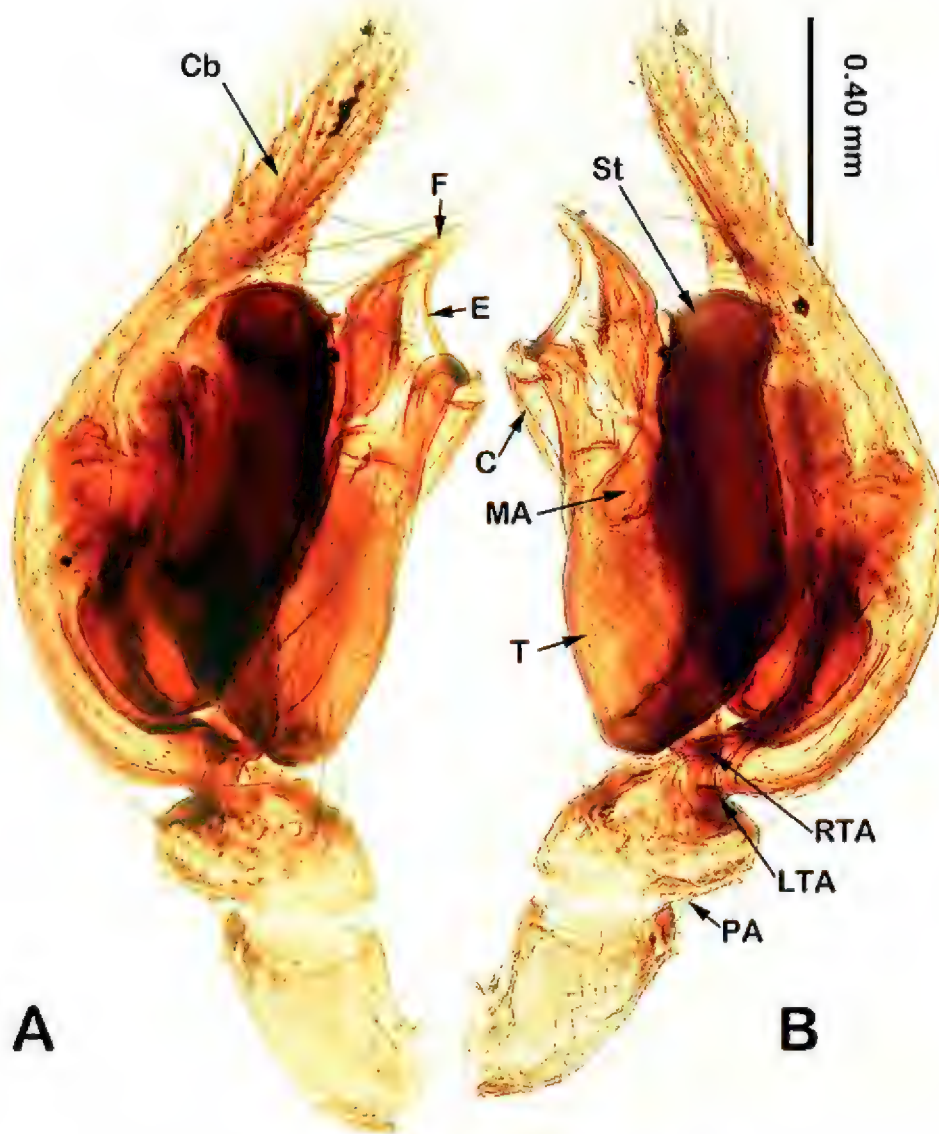
**Redescription.** Total length 6.74. Carapace 2.89 long 2.24 wide. Abdomen 3.85 long 1.92 wide. Habitus as in Fig. 12C. Carapace brownish-yellow, four pairs of brown lateral bands, cephalic region dark brown. Fovea short. Eye sizes and interdistances: AME 0.17, ALE 0.20, PME 0.16, PLE 0.19, AME–AME 0.13, AME–PME 0.20, ALE–PLE 0.06, PME–PME 0.16, PME–PLE 0.06. Chelicerae dark brown. Labium 2/3 length of endites. Labium and endites brownish-yellow. Sternum brown-yellow. Legs yellow. Leg measurements: I– (3.21, 4.49, 3.21,–), II 10.57 (2.56, 3.53, 2.56, 1.92), III 10.25 (2.56, 3.21, 2.56, 1.92), IV 12.19 (3.21, 3.85, 3.53, 1.60). Tarsi of leg I missing. Abdomen ovoid, cream colored, two faded horizontal parallel black lines present. Spinnerets cream colored (Fig. 12C).

Palp as in Fig. 10A, B. Cymbium 1.2 long, thick and rounded distally. Sub-tegulum edge raised at point of attachment to the fulcrum (Fig. 10A). Ratio of the retrolateral tibial apophysis to the lateral tibial apophysis 5:1, retrolateral tibial apophysis large with a rounded apex (Fig. 10B). Patella apophysis cone-shaped, pointed apex, 1/2 length of tibia. Patella twice the length of tibia. Median apophysis non-sclerotized. Embolus origination centrally, thick, pointed tip (Fig. 10B).

Female unknown.

**Distribution.** Mozambique (Fig. 13).





**Figure 10.** Palp of *Mistaria teteana*, holotype male **A** prolateral view **B** ventral view **C** retrolateral view. C, conductor; Cb, cymbium; CF, cymbium furrow; E, embolus; F, fulcrum; LTA, prolateral tibial apophysis; MA, median apophysis; PA, patella apophysis; RTA, retrolateral tibial apophysis, ST, sub tegulum; T, tegulum.

***Mistaria zuluana* (Roewer, 1955), comb. nov.**

Figs 11, 12J, 13

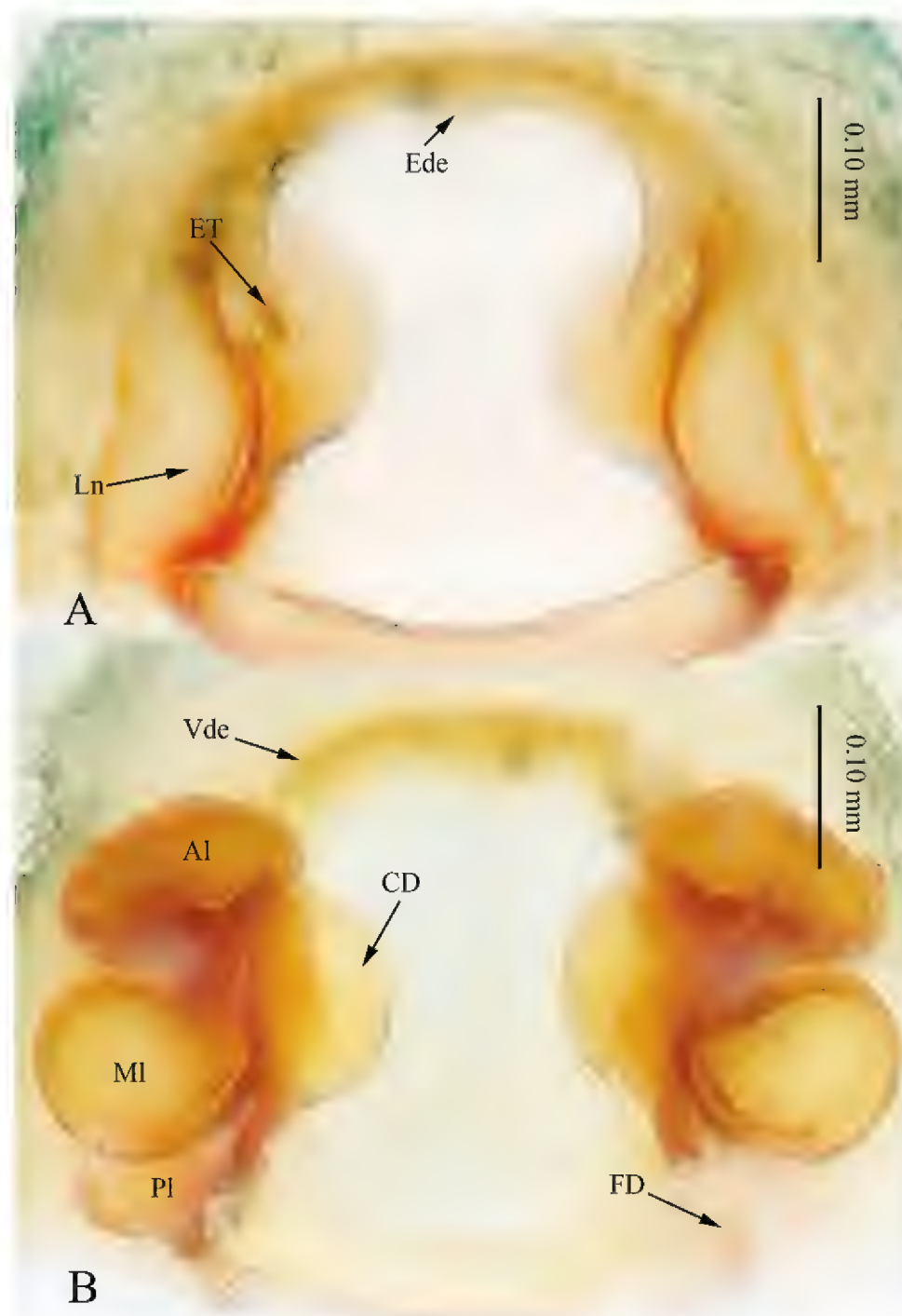
*Agelena zuluana* Roewer 1955: 63.

**Type material examined.** Holotype ♀, South Africa, Zululand, Ulundi, 1953, Coll. C.F. Roewer (SMF 9904908).

**Diagnosis.** *M. zuluana* comb. nov. and *M. nyassana* have similarly shaped epigyne anterior delimiting edge (Figs 9A, 11A) and almost equal size (Fig. 12H, J). However, *M. zuluana* comb. nov. can be distinguished from *M. nyassana* by the shape and distance of copulatory ducts which are clearly visible and close together in *M. zuluana* comb. nov. (Fig. 11B) compared to reduced and further apart in *M. nyassana* (Fig. 9B).

**Redescription.** Total length 6.81. Carapace 2.81 long 2.40 wide. Abdomen 4.00 long 2.40 wide. Habitus as in Fig. 12J. Carapace slightly longer than wide, brownish-yellow, four pairs of black lateral bands present. Cephalic region dark brown. Fovea short. Eye sizes and interdistances: AME 0.16, ALE 0.19, PME 0.17, PLE 0.19, AME–AME 0.08, AME–PME 0.19, ALE–PLE 0.08, PME–PME 0.13, PME–PLE 0.14.





**Figure 11.** *Mistaria zuluana*, holotype female **A** epigyne, ventral view **B** vulva, dorsal. Al, anterior lobe of spermatheca; CD, copulatory duct; Ede, epigyne delimiting edge (anterior); ET, epigynal teeth; FD, fertilization duct; Ln, lateral notches; MI, median lobe of spermatheca; PI, posterior lobe of spermatheca; Vde, vulva delimiting edge (anterior).

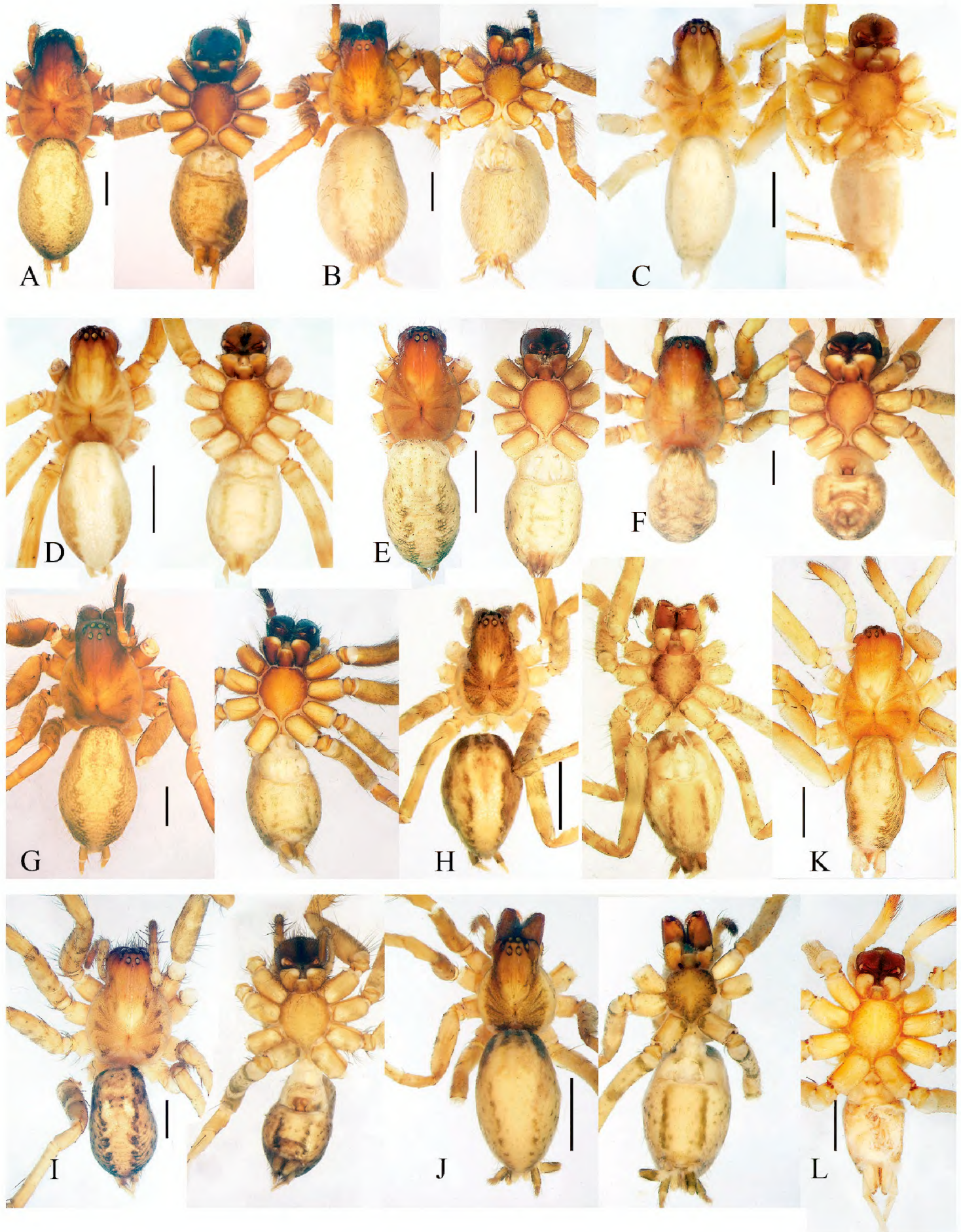
Chelicerae dark brown. Labium  $\frac{3}{4}$  length of endites, yellow suffused with black. Endites yellow. Sternum yellow suffused with black. Legs creamish-yellow. Leg measurements: I 10.20 (3.00, 3.20, 2.40, 1.60), II 9.60 (3.00, 3.00, 2.20, 1.40), III 8.40 (2.40, 2.60, 2.00, 1.40), IV 11.60 (3.20, 3.60, 3.20, 1.60). Abdomen ovoid, two horizontal parallel black lines. Posterior spinnerets yellow suffused with black (Fig. 12J).

Epigyne as in Fig. 11A, B. Teeth short and pointed, same distance as lateral notches. Anterior delimiting edge concave but with a ridge at the center (Fig. 11A). Vulva anterior delimiting edge concave. Copulatory duct originating centrally, projected anteriorly (Fig. 11B). Anterior lobe transversely ovoid, smaller than the median lobe (Fig. 11B).

Male unknown.

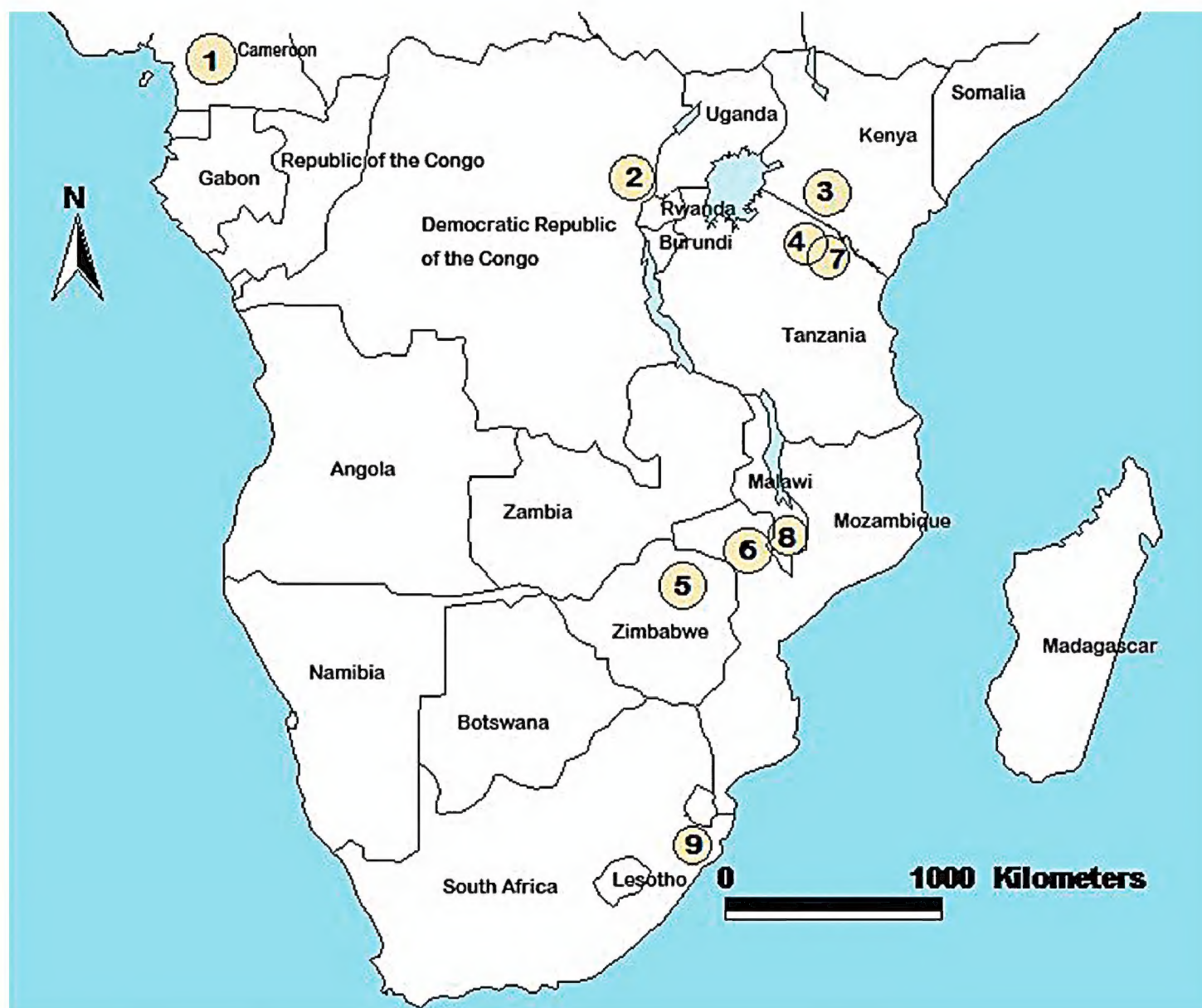
**Distribution.** South Africa (Fig. 13).





**Figure 12.** Habitus **A** *M. kiboschensis* **B** *M. jumbo* **C** *M. teteana* **D** *M. jaundea* **E** *M. moschiensis* **F** *M. mos-sambica* **G** *M. keniana* **H** *M. nyassana* **I** *M. lawrencei* **J** *M. zuluana* **K, L** *M. longimamillata*; Scale bars: 2mm.





**Figure 13.** Known distribution of 11 *Mistaria* species from Africa. 1 *M. jaundea* 2 *M. jumbo* 3 *M. keniana* 4 *M. kiboschensis* 5 *M. lawrencei* 6 *M. longimamillata*, *M. mossambica*, *M. teteana* 7 *M. moschiensis* 8 *M. nyassana* 9 *M. zuluana*.

## Discussion

Roewer (1955) described or redescribed 11 *Agelena* species from various countries in Africa, and this work revises and transfers these species to the genus *Mistaria*. The transfers that were made in this work from *Agelena* to *Mistaria* were based on shared similarities in copulatory organs of these species to the type species of *Mistaria*, i.e. *M. leucopyga*. The narrow focus on species from one author in this work shows that more revision is necessary for African agelenids.

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